

APPENDIX B

Methodology

Air Quality Data Base

The ambient air quality data presented in this report are obtained from EPA's Aerometric Information Retrieval System (AIRS). These are direct measurements of pollutant concentrations at monitoring stations operated by state and local governments throughout the nation. The monitoring stations are generally located in larger urban areas. EPA and other federal agencies operate some air quality monitoring sites on a temporary basis as a part of air pollution research studies. The national monitoring network conforms to uniform criteria for monitor siting, instrumentation, and quality assurance.^{1,2}

In 1995, 4800 monitoring sites reported air quality data for one or more of the six NAAQS pollutants to AIRS. The geographic locations of these monitoring sites are displayed in Figures B-1 to B-6. The sites are identified as National Air Monitoring Stations (NAMS) or State and Local Air Monitoring Stations (SLAMS).

Air quality monitoring sites are selected as national trends sites if they have complete data for at least eight of the 10 years between 1986 and 1995. The annual data completeness criteria are appropriate to each pollutant and measurement methodology. Table B-1 displays the number of sites meeting the 10-year trend completeness criteria. For the PM-10 standard which was established in 1987, the trend analyses are based on sites with data in seven of the eight years between 1988 and 1995. Because of the annual turnover of monitoring sites, the use of a moving 10-year window maximizes the number of sites available for trends and yields a data base that is more consistent with the current monitoring network.

The air quality data are divided into two major groupings: daily (or 24-hour) measure-

Table B-1. Number of Ambient Monitors Reporting Data to AIRS

Pollutant	Number of Sites Reporting Data to AIRS in 1995	Number of Trend Sites 1986-95
CO	542	334
Pb	448	189
NO ₂	406	212
O ₃	972	573
PM-10	1,737	955
SO ₂	695	473
Total	4,800	2,736

ments and continuous 1-hour measurements. The daily measurements are obtained from monitoring instruments that produce one measurement per 24-hour period and typically operate on a systematic sampling schedule of once every six days, or 61 samples per year. Such instruments are used to measure PM-10 and lead. More frequent sampling of PM-10 (every other day or every day) is also common. Only PM-10 weighted (for each quarter to account for seasonality) annual arithmetic means that meet the AIRS annual summary criteria are selected as valid means for trends purposes.³ Only lead sites with at least six samples per quarter in three of the four calendar quarters qualify as trends sites. Monthly composite lead data are used if at least two monthly samples are available for at least three of the four calendar quarters.

Monitoring instruments that operate continuously produce a measurement every hour for a possible total of 8760 hourly measurements in a year. For hourly data, only annual averages based on at least 4380 hourly observations are considered as trends statistics. The SO₂ standard-related daily statistics require 183

daily values to be included in the analysis. Ozone sites meet the annual trends data completeness requirement if they have at least 50 percent of the daily data available for the ozone season, which varies by state, but typically runs from May through September.⁴

methodology are available in a companion report, *National Air Pollutant Emission Trends, 1900–1995*.⁶

Air Quality Trend Statistics

The air quality statistics presented in this report relate to the pollutant-specific NAAQS and comply with the recommendations of the Intra-Agency Task Force on Air Quality Indicators.⁵ A composite average of each of the trend statistics is used in the graphical presentations throughout this report. All sites were weighted equally in calculating the composite average trend statistic. Missing annual summary statistics for the second through ninth years for a site are estimated by linear interpolation from the surrounding years. Missing end points are replaced with the nearest valid year of data. The resulting data sets are statistically balanced, allowing simple statistical procedures and graphics to be easily applied. This procedure also is conservative since endpoint rates of change are dampened by the interpolated estimates.

Emissions Estimates Methodology

Trends are presented for annual nationwide emissions of CO, lead, nitrogen oxides (NO_x), volatile organic compounds (VOCs), PM-10, and SO₂. These are estimates of the amount and kinds of pollution being emitted by automobiles, factories and other sources, based upon best available engineering calculations.

The estimates of emissions in this report differ from those reported in previous reports due to improvements in emissions estimation methodologies. Readers should note that the 1990 to 1995 emissions estimates are based on some preliminary data and are subject to revision in future reports. Also, this report incorporates data from continuous emissions monitors collected between 1994 and 1995 for NO_x and SO₂ emissions at major electric utilities. Additional emissions estimates and a more detailed description of the estimation



Figure B-1. CO monitoring network, 1995.



Figure B-2. Pb monitoring network, 1995.



Figure B-3. NO_2 monitoring network, 1995.



Figure B-4. O_3 monitoring network, 1995.

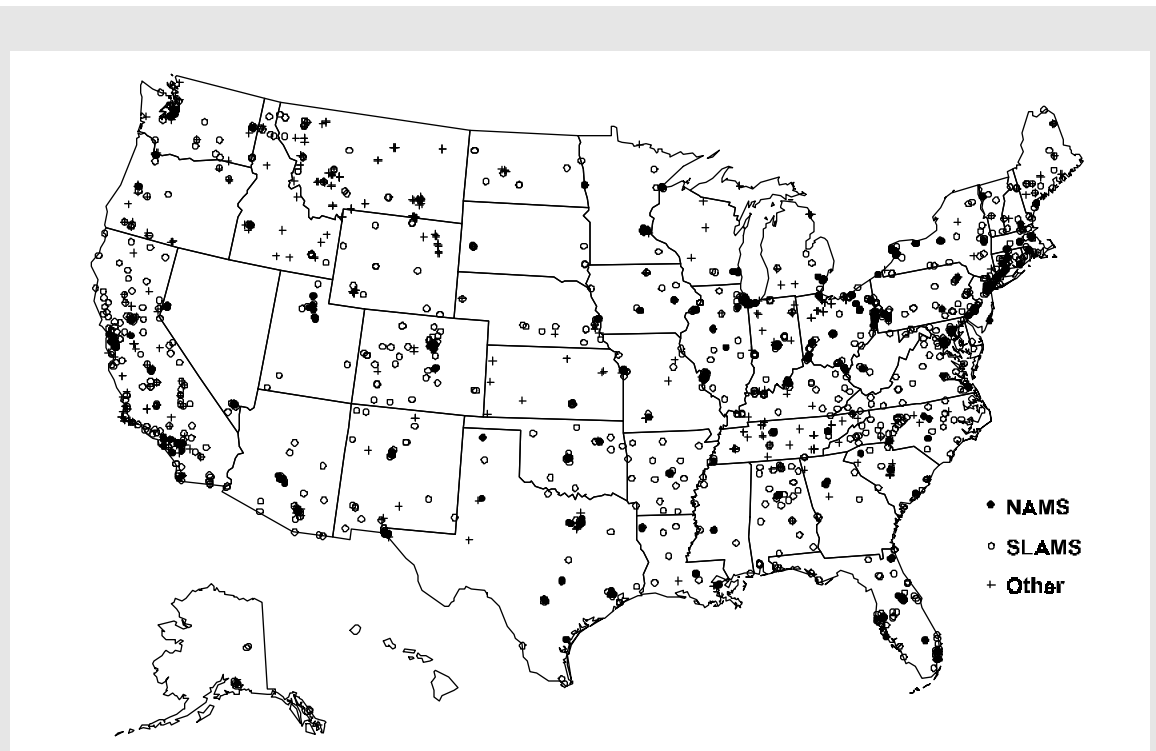


Figure B-5. PM-10 monitoring network, 1995.



Figure B-6. SO₂ monitoring network, 1995.

References

1. *Clean Air Act Amendments of 1990*, U.S. Code, volume 42, section 7403(c)(2), 1990.
2. *Ambient Air Quality Surveillance*, 44 CFR 27558, May 10, 1979.
3. *Aerometric Information Retrieval System (AIRS)*, Volume 2, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, October, 1993.
4. *Ambient Air Quality Surveillance*, 51 FR 9597, March 19, 1986.
5. *U.S. Environmental Protection Agency Intra-Agency Task Force Report on Air Quality Indicators*, EPA-450/4-81-015, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, February 1981.
6. *National Air Pollutant Emission Trends, 1900–1995*, EPA-454/R-96-007, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, October, 1995.